

DP {1, 2, 3, 4, 5} ^{APP.} Sheet 1

Q Find value of θ for which

$$\sin \theta = -\frac{1}{2}$$

$$\sin \theta = -ve \rightarrow \begin{cases} 3^{rd} & (\pi + \frac{\pi}{6}) \\ 4^{th} & (2\pi - \frac{\pi}{6}) \end{cases}$$

$$\sin \theta = \frac{\pi}{6}$$

$$\sin(\pi + \frac{\pi}{6}) = -\sin \frac{\pi}{6} = -\frac{1}{2}$$

$$\sin(2\pi - \frac{\pi}{6}) = -\sin \frac{\pi}{6} = -\frac{1}{2}$$

④

$$\frac{7\pi}{6} = 210^\circ, \quad \frac{11\pi}{6} = 330^\circ$$

Q find value of θ if $\tan \theta = -\frac{\sqrt{3}}{3}$

$$\tan \theta = -ve \rightarrow \begin{cases} 2^{nd} \\ 4^{th} \end{cases}$$

②

$$\tan(\pi - \frac{\pi}{3}) = -\tan \frac{\pi}{3} = -\sqrt{3}$$

$$\tan(2\pi - \frac{\pi}{3}) = -\tan \frac{\pi}{3} = -\sqrt{3}$$

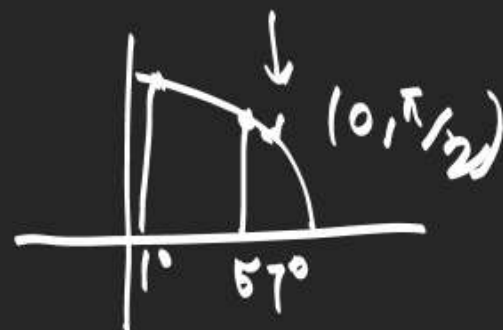
$\frac{2\pi}{3} \quad \frac{5\pi}{3}$
 $120^\circ \quad 300^\circ$

Q $\tan 1 > \tan 1^\circ$ [T/F]

$\downarrow$
 $\approx \tan 57^\circ \rightarrow \tan 1^\circ$?
 $\uparrow (0, \frac{\pi}{2})$

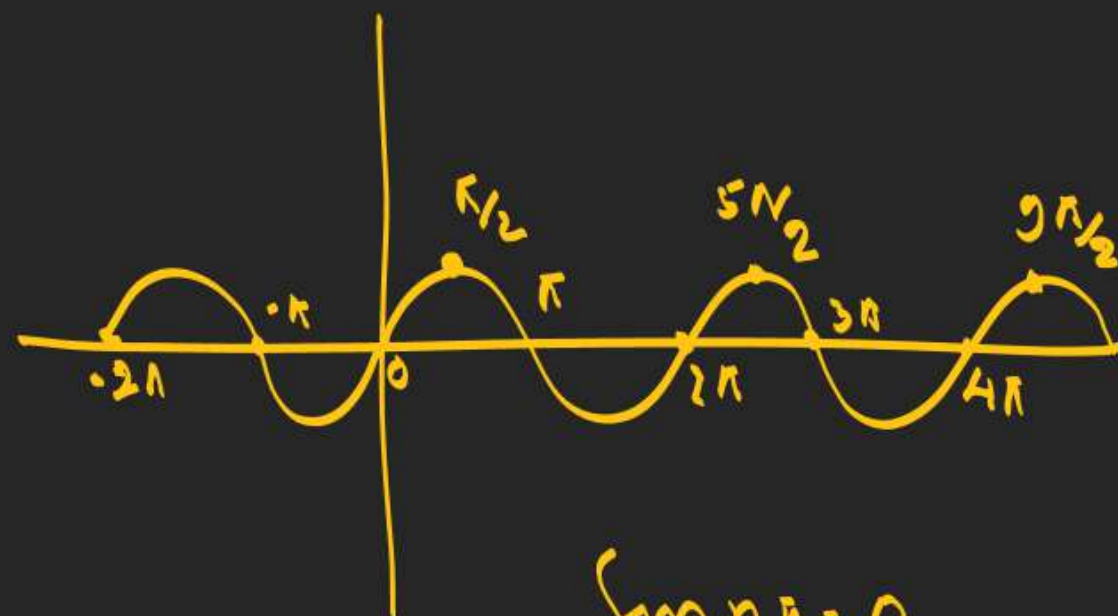
True

Q $\cos 1 > \cos 1^\circ$



$\cos 57^\circ > \cos 1^\circ$ (given)
 False.

① $y = \sin x$



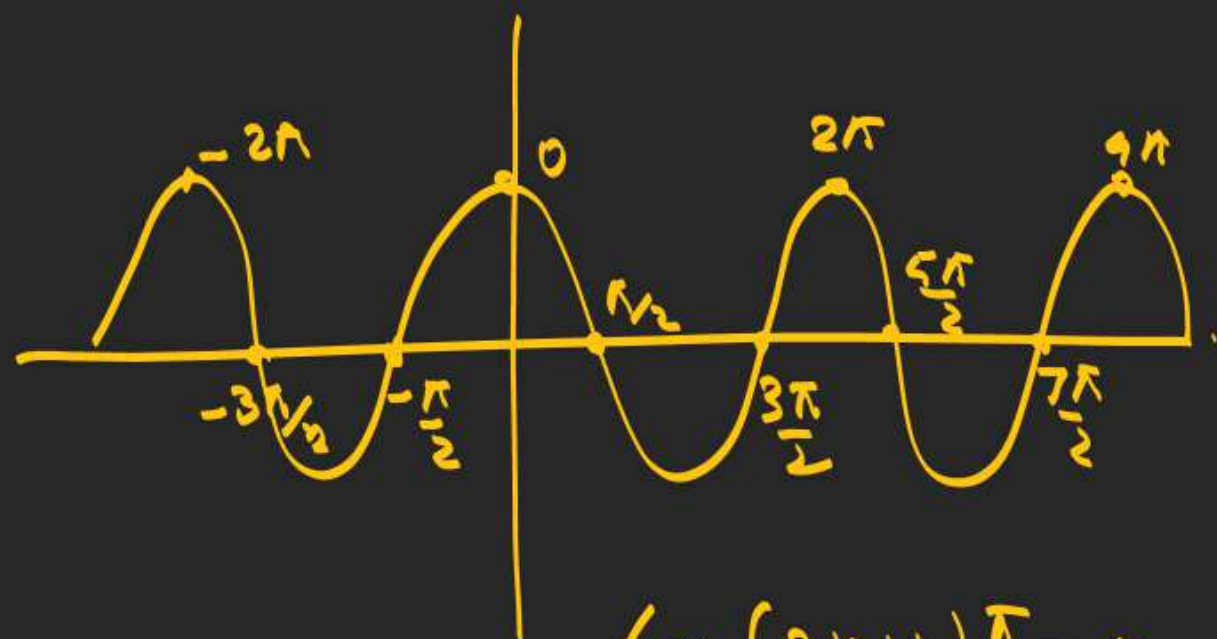
$\sin n\pi = 0$

$\sin (4n+1)\frac{\pi}{2} = 1$

$\sin (4n+3)\frac{\pi}{2} = -1$

$\sin \text{ odd } \frac{\pi}{2} = \pm 1$

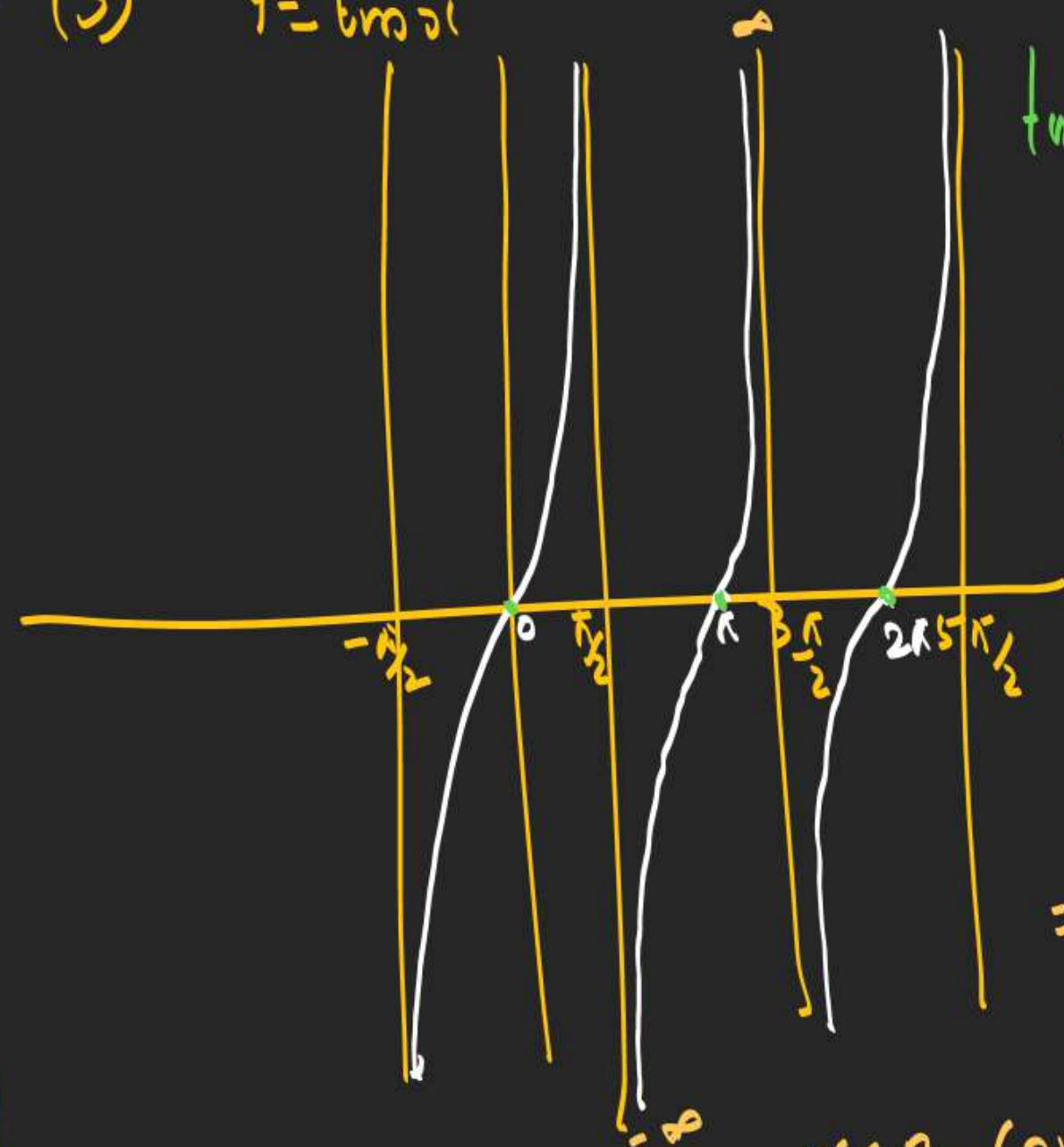
2) $y = \cos x$



$$\cos\left(2n+1\right)\frac{\pi}{2} = 0$$

$$\left. \begin{array}{l} \cos(\text{Even})\pi = 1 \\ \cos(\text{Odd})\pi = -1 \end{array} \right\} \cos n\pi = \pm 1$$

(3) $y = \tan x$



$$\tan x = \frac{\sin x}{\cos x}$$

$$\tan n\pi = 0$$

$$R_f = \mathbb{R}$$

dom.

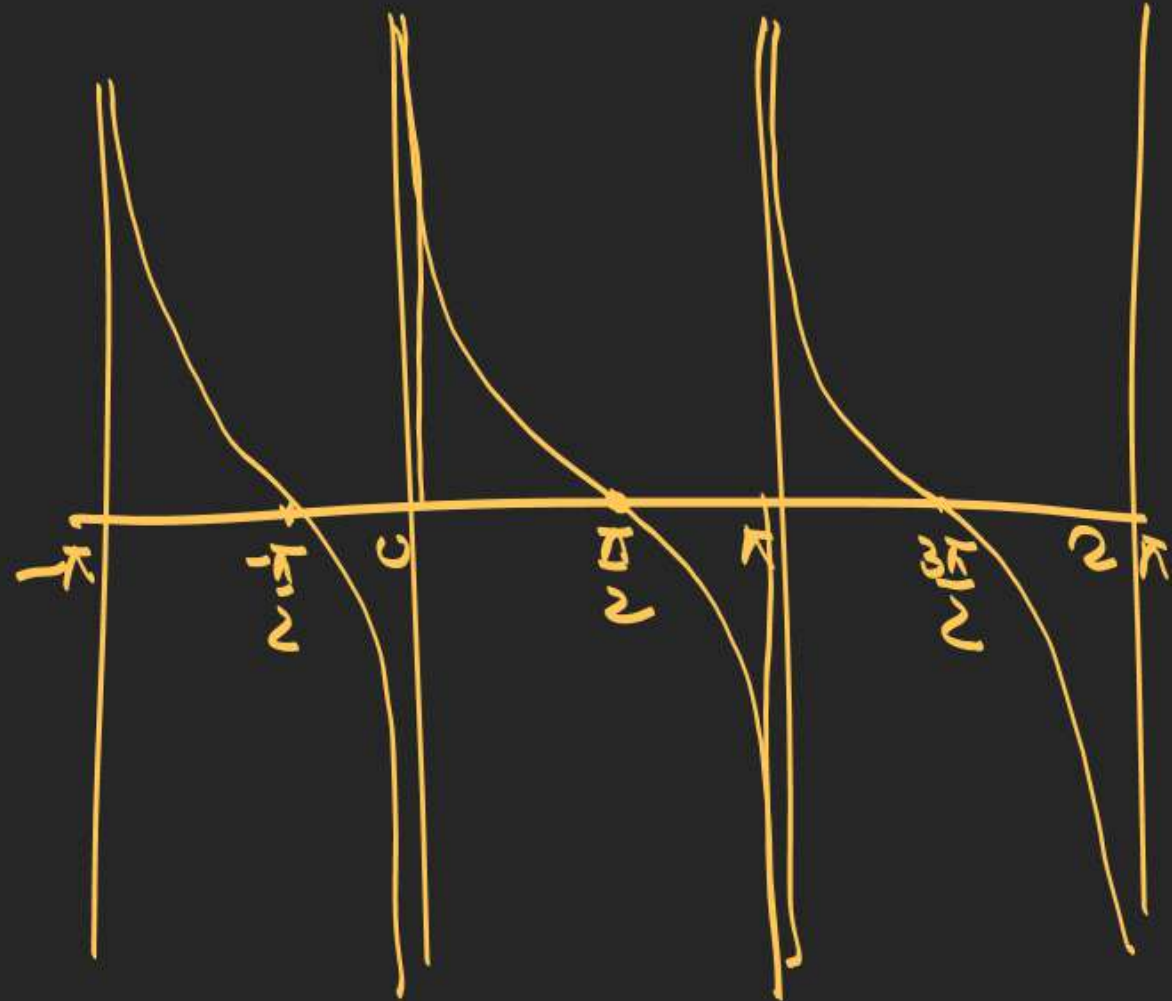
$$= \mathbb{R} \setminus \{0\}$$

$$x \neq (2n+1)\frac{\pi}{2}$$

$$x \in \mathbb{R} - (2n+1)\frac{\pi}{2}$$

$$4) y = \cot x = \frac{\cos x}{\sin x}$$

$$\sin x \neq 0$$



$$\frac{dy}{dx} = -\frac{\cos^2 x}{\sin^2 x}$$

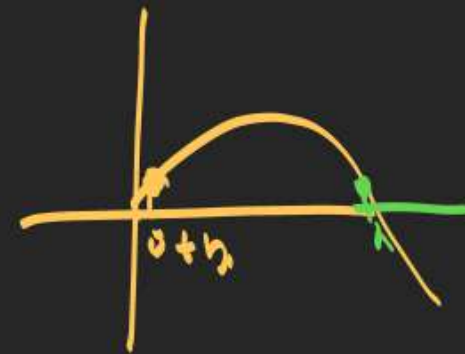
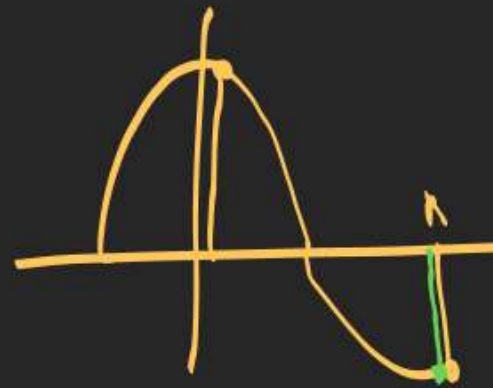
$$= -ve$$



$$f(0+h) = \lim_{h \rightarrow 0} \frac{\cos(0+h)}{\sin(0+h)} \Rightarrow \frac{1}{+0} \rightarrow +\infty$$

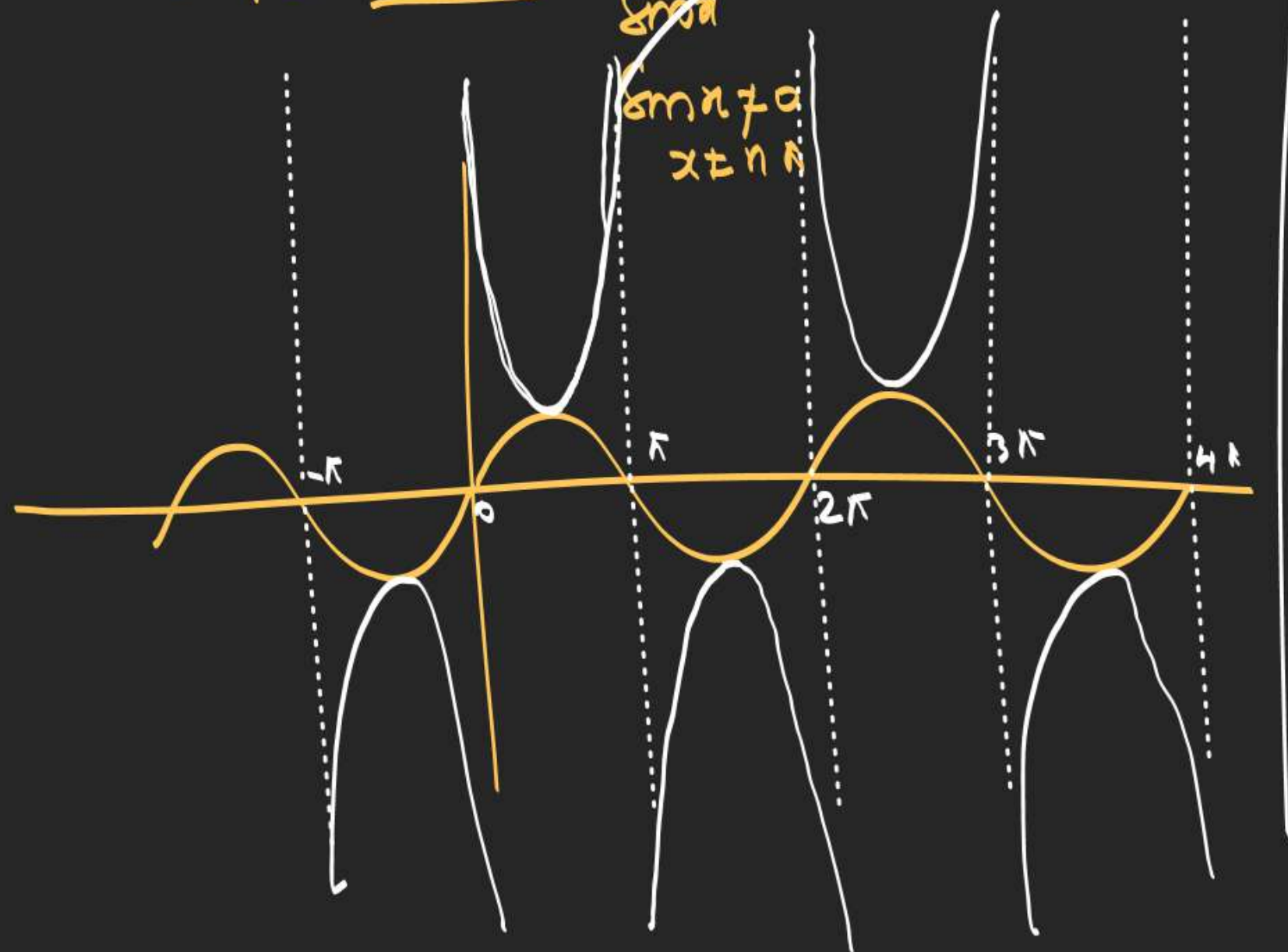
$$f(\pi-h) = \lim_{h \rightarrow 0} \frac{\cos(\pi-h)}{\sin(\pi-h)} \Rightarrow \frac{-1}{0} \rightarrow -\infty$$

$$1) \text{ Let } 0+h = \frac{\pi}{2} = 0$$



$$5) y = \frac{\cos x}{\sin x} = \frac{1}{\tan x}$$

amplitude
 $x \neq n\pi$



$$(1) \sec(0+h) \rightarrow \infty$$

$$(2) \sec(\pi-h) \rightarrow \infty$$

$$(3) \sec \frac{\pi}{2} = -1$$

Aadhe Se Kam / Aadhe Se Jyada.

$$1) \sin\left(\frac{5\pi}{6}\right) \Rightarrow \begin{array}{l} D r = 6, N r = 5 \\ \downarrow \\ \text{half} = 3 \end{array} \left. \begin{array}{l} N r > D r \text{ half} \\ 5 > 3 \end{array} \right\} \begin{array}{l} \text{If } N r > D r \text{ half} \\ \text{then we try to} \\ \text{Create } \pi - \theta \end{array}$$

$$\sin\left(\frac{5\pi}{6}\right) = \sin\left(\frac{6\pi - \pi}{6}\right) \\ = \sin\left(\pi - \frac{\pi}{6}\right)$$

$$2) \sin\left(\frac{7\pi}{19}\right) \Rightarrow \begin{array}{l} D r = 19 \\ \downarrow \\ 9.5 \end{array} N r = 7 \Rightarrow \begin{array}{l} N r < D r \text{ half} \\ 7 < 9.5 \end{array} \left. \right\} \begin{array}{l} \text{If } N r < D r \text{ half} \\ \text{then Try to} \\ \text{create } \left(\frac{\pi}{2} - \theta\right) \end{array}$$

$$\sin\left(\frac{19\pi - 5\pi}{38}\right)$$

$$\frac{19\pi}{38}$$

$$\tan\left(\frac{3\pi}{11}\right) = \tan\left(\frac{11\pi - 5\pi}{22}\right)$$

6π मिलाई

$$N/r = 3$$

Dr's half = 5.5

$$\cot\left(\frac{2\pi}{5}\right) = \cot\left(\frac{5\pi - \pi}{10}\right)$$

4π

$$\sec\left(\frac{3\pi}{9}\right) = \sec\left(\frac{9\pi - 3\pi}{18}\right)$$

$6\pi, 12\pi, 9\pi$

$$\frac{8\pi}{22} \quad \sin\left(\frac{4\pi}{11}\right) = \sin\left(\frac{11\pi - 3\pi}{22}\right) = \sin\left(\frac{\pi}{2} - \frac{3\pi}{22}\right)$$

Series Base Q5(1)

$$Q \quad (1 + \omega \frac{\pi}{6}) (1 + \omega \frac{\pi}{3}) (1 + \omega \frac{2\pi}{3}) (1 + \omega \frac{5\pi}{6}) = ?$$

$$(1 + \omega \frac{\pi}{6}) (1 + \omega \frac{2\pi}{6}) (1 + \omega \frac{4\pi}{6}) (1 + \omega \frac{5\pi}{6})$$

$$(1 + \omega \frac{\pi}{6}) (1 + \omega \frac{2\pi}{6}) \left(1 + \omega \left(\frac{6\pi - 2\pi}{6}\right)\right) \left(1 + \omega \left(\frac{6\pi - \pi}{6}\right)\right)$$

$$(1 + \omega \left(\pi - \frac{2\pi}{6}\right)) (1 + \omega \left(\pi - \frac{\pi}{6}\right))$$

$$(1 + \omega \frac{\pi}{6}) (1 + \omega \frac{2\pi}{6}) (1 - \omega \frac{2\pi}{6}) (1 - \omega \frac{\pi}{6})$$

$$(1 - \omega^2 \left(\frac{\pi}{6}\right)) (1 - \omega^2 \left(\frac{2\pi}{6}\right)) = \omega^2 \frac{\pi}{6} \times \omega^2 \left(\frac{\pi}{3}\right)$$

$$= \left(\frac{1}{2}\right)^2 \times \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{3}{16}$$

① 4 terms Series.

② 1st 2 chhod dijiye, last (2) sochinge

$$(3) \quad \omega \frac{4\pi}{6}, \quad \omega \frac{5\pi}{6}$$

Nr = 4

Dr half = 3

Nr > Dr's half

Nr = 5

Dr's half = 3

($\pi - 0$)

$$Q \quad \tan \frac{\pi}{11} + \tan \frac{2\pi}{11} + \tan \frac{4\pi}{11} + \tan \frac{7\pi}{11} + \tan \frac{9\pi}{11} + \tan \frac{10\pi}{11}$$

① 6 terms Series Jesu

(2) last 3 will be turn up into $(\pi - \theta)$

$$+ \tan\left(\frac{11\pi - 4\pi}{11}\right) + \tan\left(\frac{11\pi - 2\pi}{11}\right) + \tan\left(\frac{11\pi - \pi}{11}\right)$$

(3) as Nr = 7, 9, 10

Nr's half = 5.5

$$\tan \frac{\pi}{11} + \tan \frac{2\pi}{11} + \tan \frac{4\pi}{11} + \tan\left(\pi - \frac{4\pi}{11}\right) + \tan\left(\pi - \frac{2\pi}{11}\right) + \tan\left(\pi - \frac{\pi}{11}\right)$$

$$\tan \frac{\pi}{11} + \tan \frac{2\pi}{11} + \tan \frac{4\pi}{11} - \tan \frac{4\pi}{11} - \tan\left(\frac{2\pi}{11}\right) - \tan\left(\frac{\pi}{11}\right) = \bigcirc$$

$$Q \cos^2 \frac{\pi}{16} + \cos^2 \frac{3\pi}{16} + \cos^2 \frac{5\pi}{16} + \cos^2 \left(\frac{7\pi}{16} \right)$$

$\rightarrow 10\pi$ $\rightarrow 14\pi$

① Series Jesa Kuchh.

② last 2 will be changed

$$+ \cos^2 \left(\frac{16\pi - 6\pi}{32} \right) + \cos^2 \left(\frac{16\pi - 2\pi}{32} \right)$$

(3) Nr = 5, 7
Dr's half = 6. } Nr < Dr's half.
($\frac{\pi}{2} - 0$) is Badman

$$+ \cos^2 \left(\frac{\pi}{2} - \frac{3\pi}{16} \right) + \cos^2 \left(\frac{\pi}{2} - \frac{\pi}{16} \right)$$

$$\cos^2 \left(\frac{\pi}{16} \right) + \cos^2 \frac{3\pi}{16} + \cos^2 \frac{3\pi}{16} + \cos^2 \frac{\pi}{16}$$

= 1 + 1 = 2

$$Q \sin^2 \frac{\pi}{18} + \sin^2 \frac{\pi}{9} + \sin^2 \frac{7\pi}{18} + \sin^2 \left(\frac{4\pi}{9} \right)$$

= 2

Q If $\cos \theta_1 + \cos \theta_2 + \cos \theta_3 + \cos \theta_4 = -4$; $\theta_1, \theta_2, \theta_3, \theta_4 \in [0, 2\pi]$

highly

Simple

But good one.

then $\sin \frac{\theta_1}{3} + \sin \frac{\theta_2}{3} + \sin \frac{\theta_3}{3} + \sin \frac{\theta_4}{3} = ?$

$$\cos \theta_1 + \cos \theta_2 + \cos \theta_3 + \cos \theta_4 = -4$$

$$-1 + -1 + -1 + -1 = -4$$

$$\theta_1 = \theta_2 = \theta_3 = \theta_4 = \pi$$

$$\text{Demand} = \sin \frac{\pi}{3} + \sin \frac{\pi}{3} + \sin \frac{\pi}{3} + \sin \frac{\pi}{3}$$

$$= \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} = 4 \times \frac{\sqrt{3}}{2} = 2\sqrt{3}$$

$$1) \cos \theta \text{ Min} = -1$$

$$2) 4 \cos \theta \text{ add ho Kar} = -4 \text{ De rahe hain}$$

3) It is possible only when all $\cos \theta$ are giving -1

$$4) \cos \theta = -1 \text{ Kab?}$$

$$\theta = \pi$$

$$Q \quad \log \boxed{\sin^2 x + \cos^4 x + 6} \quad (\cos^2 x + \sin^4 x + 6) = ?$$

Interestingly.

$$\begin{aligned} & \sin^2 x + \cos^4 x \\ &= \sin^2 x + (1 - \sin^2 x)^2 \\ &= \sin^2 x + \sin^4 x - 2\sin^2 x + 1 \\ &= \sin^4 x + 1 - \sin^2 x \\ &= \sin^4 x + \cos^2 x \end{aligned}$$

$$\log (\sin^4 x + \cos^2 x + 6) = 2$$

$$Q \quad \sin(45^\circ + \theta) \cdot \cos(15^\circ + \theta) - \cos(45^\circ + \theta) \cdot \sin(15^\circ + \theta)$$

$$\sin A \cdot \cos B - \cos A \sin B = \sin(A - B)$$

$$\sin((45^\circ + \cancel{\theta}) - (15^\circ + \cancel{\theta})) = \sin 30^\circ = \frac{1}{2}$$

$$Q \quad \text{If } \boxed{\sin \alpha \sin \beta - \cos \alpha \cos \beta + 1 = 0}$$

then value of $1 + \cot \alpha \cdot \tan \beta = ?$

$$1 = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$2 = \cos(\alpha + \beta)$$

$$0 = \sin(\alpha + \beta)$$

$$\text{Demand} = 1 + \cot \alpha \cdot \tan \beta$$

$$= 1 + \frac{\cos \alpha}{\sin \alpha} \cdot \frac{\sin \beta}{\cos \beta}$$

$$= \frac{\sin \alpha \cos \beta + \cos \alpha \sin \beta}{\sin \alpha \cos \beta} \cdot \frac{\sin(\alpha + \beta)}{\sin \alpha \cos \beta} = \frac{0}{\sin \alpha \cos \beta}$$

$$Q \frac{\sin 24^\circ \cdot \cos 6^\circ - \sin 6^\circ \cdot \sin 66^\circ}{\sin 21^\circ \cdot \cos 39^\circ - \sin 51^\circ \cdot \sin 69^\circ} = ?$$

$$\sin 21^\circ \cdot \cos 39^\circ - \sin 51^\circ \cdot \sin 69^\circ$$

$$\cos 66^\circ \cdot \cos 6^\circ - \sin 66^\circ \cdot \sin 6^\circ$$

$$\cos 69^\circ \cdot \cos 39^\circ - \sin 69^\circ \cdot \sin 39^\circ$$

$$= \frac{\cos(66^\circ + 6^\circ)}{\cos(69^\circ + 39^\circ)} = \frac{\cos 72^\circ}{\cos(108^\circ)}$$

$$= \frac{\sin 18^\circ}{\sin(90+18^\circ)} = \frac{\sin 18^\circ}{-\cos 18^\circ} = -1$$

(2)

$$\boxed{24^\circ + 66^\circ = 90^\circ} \text{ (complementary)}$$

$$\sin 24^\circ = \cos 66^\circ$$

$$21^\circ + 69^\circ = 90^\circ$$

$$51^\circ + 39^\circ = 90^\circ$$

$$\cos(90 - \theta) = \sin \theta$$

$$\cos(90 - 24^\circ) = \sin 24^\circ$$

$$\cos 66^\circ = \sin 24^\circ$$

1, 2, 3, 4, 5 Sheet Seq 12

① $\sum_{k=1}^{13} \frac{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right) \cdot \sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)}{\sin\frac{\pi}{6}} = 2 \times \frac{\sin\frac{\pi}{6}}{\sin\frac{\pi}{6}}$

① difference $\rightarrow \left(\frac{\pi}{4} + \frac{k\pi}{6}\right) - \left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right)$

$\frac{k\pi}{6} - \left(\frac{k\pi}{6} - \frac{\pi}{6}\right) = \frac{\pi}{6}$

(2) Sin (diff) Multiply in Nr & Dr Both.

$45^\circ + 30^\circ$

$\frac{1}{\sin\frac{\pi}{6}} \sum_{k=1}^{13} \frac{\sin\left\{\left(\frac{\pi}{4} + \frac{k\pi}{6}\right) - \left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right)\right\}}{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right) \cdot \sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)}$

$2 \sum_{k=1}^{13} \frac{\sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right) \cdot \cos\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right) - \cos\left(\frac{\pi}{4} + \frac{k\pi}{6}\right) \cdot \sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right)}{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right) \cdot \sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)}$

$2 \sum_{k=1}^{13} \left\{ \cot\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right) - \cot\left(\frac{\pi}{4} + \frac{k\pi}{6}\right) \right\} = \frac{1}{2} \left\{ \begin{aligned} &\cot\left(\frac{\pi}{4} + 0\right) - \cot\left(\frac{\pi}{4} + \frac{\pi}{6}\right) = \frac{1}{2} \{1 - \cot 75^\circ\} \\ &+ \cot\left(\frac{\pi}{4} + \frac{\pi}{6}\right) - \cot\left(\frac{\pi}{4} + \frac{2\pi}{6}\right) = \frac{1}{2} \{1 - \cot 15^\circ\} \\ &+ \cot\left(\frac{\pi}{4} + \frac{2\pi}{6}\right) - \cot\left(\frac{\pi}{4} + \frac{3\pi}{6}\right) = \frac{1}{2} \{1 - (2-1)\} \\ &\vdots \\ &+ \cot\left(\frac{\pi}{4} + \frac{12\pi}{6}\right) - \cot\left(\frac{\pi}{4} + \frac{13\pi}{6}\right) \end{aligned} \right\}$

$= \frac{\sqrt{3}-1}{2}$